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ELECTRICITY,

AS USED IN

*PARTURITION, POST-PARTUM HEMORRHAGE, AND
RESUSCITATION OF NEW-BORN INFANTS.*

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BY

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ELECTRICITY AS USED IN PARTURITION, POST-PARTUM HEMORRHAGE, AND RESUSCITATION OF NEW-BORN INFANTS.

BY ALEXANDER MURRAY, M.D., NEW YORK.

(*Read before the Neurological Society, June 7, 1875.*)

MR. PRESIDENT AND GENTLEMEN: It is only within a comparatively late period that electricity, as an oxytotic, has engaged the attention of the profession; but, like almost all other discoveries in medical science, it has been the subject of much controversy. On one side we find Bertholon, Herder, Radford, and others as advocating its use; while on the other, we find Simpson and Scanzoni denying its utility. Sir James Simpson, though he admits that success had sometimes attended his efforts, yet is disposed to throw discredit on the means he used, and to attribute the result to other or natural causes. This opinion, coming from so eminent a gynecologist, has doubtless prevented many from using this remedy. But even were we to admit the correctness of the inference he drew, we must object to his opinion, from the fact that the time at which he employed the current was inopportunately chosen; inasmuch as it was during the dilatation of the os uteri, or first stage of labor, and not in the second stage, when expansion would have sufficiently progressed, and expulsive action have set in.

I regard as well founded St. Germain's conclusion, that uterine contractions cannot be produced if they have not spontaneously commenced. With this conclusion my own observations fully coincide. But I am forced to differ from another conclusion of his, that dilatation of the os continues rapidly with the action of electricity; for it is hardly to be supposed that by an artificial stimulus we can at the same time cause contraction and dilatation, or simulate the two-fold action of nature by that which in itself is single. The effect or property of electricity is much the same as that of ergot; that is to say, it is general over the fundus, body, and cervix. I am by no means desirous to hinder the progress of science, or to be petulantly sceptical; but if it can be shown that by electricity, or by any other agent, we can at the same time, and by the same application, promote the contraction of all the muscular fibres of the uterus, as well as dilatation of the os, I must admit that a very great advance has been made, and much wish that, if this be the conclusion of Saint Germain, it shall be fully corroborated and established in obstetrics.

Meanwhile, if only for the sake of prudence and safety, I must adhere to the practice of waiting for the dilatation of the os uteri, or second stage of labor, taking care that there is no obstacle in the way of the expulsion of the fœtus in this direction, as I do with regard to all other

obstacles of whatever kind, before I attempt to excite uterine contraction, or to force out the contents of the uterus before the way is free for them.

But, since we use electricity not only to disburden the womb of its contents, but also to arrest hemorrhage, objections of the kind just stated are in this instance of little weight; for benefit rather than risk will then be derived from closing the os—an object we strive to obtain artificially when we resort to plugging.

This last-mentioned use of electricity is highly important, and will, I am persuaded, save many a life by promoting the contraction of the uterus, by serving to expel clots of blood and whatever fragments of the placenta or membranes may remain; and especially, to constrict the vessels, and thus arrest flooding at the source.

It is necessary to notice that the action of electricity in the striated and non-striated muscles is not the same. In the voluntary fibre the action is rapid, and rapidly ceases, in all ordinary cases; but in the involuntary, the contraction is somewhat slow to begin, and is as slow to subside, as we see in the cœcum, gall bladder, and other organs, and as we notice especially in the uterus. In this, therefore, we have a manifest inducement, and, as it were, counsel from nature to assist her by an agent which acts in her own way, raising the force by gradual stages to its full height, and by the same gradual stages allowing it to fall.

Another matter deserving of notice is, that contraction of the involuntary muscles is always in the functional or physiological direction; onwards in the gall ducts and cœcum, downwards in the ureters, and downwards in the uterus; but never in the antiperistaltic direction, and this no matter whether we use the descending or ascending current. However, an exception must be here mentioned, for the observation just made is based upon the supposition that the current has been transmitted generally through the organ, from fundus to cervix, and not locally or laterally, when according to Duchennes' theory we localize the application, and so the contraction. In this way it is possible to produce a narrowing at some one part only, or even an hour-glass contraction, as Mackenzie proved by experiments on the gravid uterus in rabbits and other animals.

The method, therefore, of employing the electric power is all-important. When Mr. Cleveland applied both poles to the abdomen he incurred the risk of inducing a partial and so an inefficient action. Some, avoiding the error of this obstetrician, have fallen into an opposite error, and included too wide a range of parts within the electrodes; as, for instance, Mackenzie, who placed one of them on the nape of the neck and the other on cervix uteri.

Kilian employed a galvanic forceps made of different metals.

Dr. Radford's method is as follows: He places one conductor over the abdomen, and the other on the os uteri; this he does in cases of labor,

which I am persuaded is an error, as I have found that when an electrode is applied directly to the cervix, it causes, as already suggested, a contraction of it, and throws an obstacle in the way of delivery.

My method is to apply in cases of labor one pole to the abdomen over the fundus uteri, and the other to the coccyx and sacrum, so as to avoid irritating the mouth of the womb by the immediate touch of the electrode.

These remarks, it must be understood, are made concerning labor, and our efforts to promote the action of the inert womb to expel its contents; for when, on the other hand, the uterus is empty, and we desire simply to arrest flooding, then Dr. Radford's method may be followed, as no injury can be done in such cases by closing the os.

Wishing to improve our appliance, I have had constructed for me by the Galvano-Faradic Co. a uterine electrode, for special use in cases of post-partum hemorrhage.



The wood-cut shows the form of the instrument. Its length is ten inches, the diameter of the disk two inches, and the length of the stem three inches. The electrode may be used either with or without the central stem.

The form of electric application I use is that known as faradization. I employ this on account of its greater intensity, and consequently the greater power it possesses over the contractile fibres.

With these preliminary observations, I will now mention in detail a few cases in which I have used faradization with beneficial results, and under circumstances which leave no doubt but that these results were due to it, and it alone.

CASE I.

Mrs. W —, aged 40; a small, delicate woman, of nervous temperament, has had six children. Her former confinements were always tedious, but towards their termination a few good expulsive pains were amply sufficient to complete the labor. She had parturient pains for about forty hours, when my assistance was required. On making a digital examination, I found the vagina cool and well lubricated with mucous; the os uteri fully dilated; the membranes ruptured; a head presentation in the right occipito-anterior position, and well advanced through the superior strait. The pains were feeble, inefficient, and recurred at intervals of ten minutes. The protracted suspense from the tediousness of the labor added much to the mental and physical distress

of the patient. The short inefficient pains being altogether powerless to expel the child, and as there was no mechanical obstacle which might give occasion to injure the mother or infant, I employed faradization for two minutes at a time, and then having waited for about three minutes, repeated the treatment. During the fourth application the uterus acted energetically, expelling a healthy male infant, and the placenta in two minutes afterwards. The labor was terminated in twenty-eight minutes from the commencement of treatment. The infant weighed 10 lbs. 10 ozs.

CASE II.

Mrs. H —, 28 years of age; a healthy, well-made woman, had been in labor two days with her third child. Dr. G. Wilson had been in attendance about six hours, and had administered two doses of ergot, which had augmented uterine action, but not to that degree necessary to expel the infant. Dr. W. desired my counsel in the case. I made a digital examination, which showed that the vagina was hot, and deficient in the mucus secretion of parturition. The pelvis was large, head presentation in the right occipito-posterior position, and engaged in the pelvis. The vagina was freely lubricated with oil and a stimulating enema, with the admixture of 3 ozs. of brandy administered. This treatment revived her somewhat and awakened uterine action for nearly two hours. At this stage of the case we would have given her another dose of ergot but for the fact that the foetal heart could be distinctly heard below the umbilicus, and besides we did not wish to jeopardize the life of the child, especially since other means of effecting delivery were at hand. After waiting for more than an hour without a return of uterine action, a faradic current of moderate strength was applied for about eight minutes; and, after an interval of three minutes' rest, the application was renewed for a period of two minutes. During the third application the uterus acted with great vigor, and in about twenty-two minutes a healthy male infant was born, face to sacrum. Child weighed 10 lbs. 2 ozs.

CASE III.

Mrs. T —, a Jewess, was in labor with her seventh child. Her last four confinements had been tedious and exhausting, though they had resulted favorably both to mother and infant without interference. She had been in labor forty-two hours when I was called to attend her. The pains were feeble and unsatisfactory, and had recurred during the last six hours of this period, at intervals of ten minutes. I found on examination a head presentation in the second position, and firmly engaged in the brim. The os uteri was about three-fourths dilated, but easily dilatable. The membranes not being ruptured, I ruptured them, and allowed the waters to escape. This had the effect of increasing the

frequency and strength of the pains for more than an hour, when they gradually became weaker and inefficient. I pushed the anterior ~~margin~~ *lip* of the os over the presentation as far as I deemed necessary, and then applied the faradic current in the same manner as in the preceding case. While making the application the uterus slipped off the head, when immediately the occiput rotated toward the symphysis pubis, and within twenty minutes after the first application a female infant was born alive, weighing 8 lbs.

CASE IV.

Mrs. O'B——, a stout, healthy Irish woman, aged 40 years, was in labor about twelve hours with her ninth child. A midwife had been in attendance for several hours. About three hours before I saw the patient the membranes had been ruptured, and the feet of the infant had descended below the vulva. The nurse had endeavored, by traction of the lower extremities, to deliver the child, but was able only to bring down the body and arms. All her efforts were unavailing to extract the head. The pains had ceased about two hours and a half before I was consulted. A vaginal examination revealed the fact that the neck of the infant had been broken. The obstacle which prevented the delivery of the child was the head of a second child, which had descended in advance of the first, forming a complete wedge or locking of the heads at the brim of the pelvis, so that neither infant could be born without manual interference. An early delivery was imperative, owing to the distressed condition of the patient. As the infant had evidently been dead for about three hours, it would have been injudicious, even with the aid of an anæsthetic, to have attempted to push the presenting head sufficiently out of the way to deliver the first child. I completed the decapitation of the latter with a strong pair of scissors and a piece of stout twine.* I now applied faradization for about eight minutes; this induced a vigorous propulsive action of the uterus, which expelled the second child alive, together with the head of the first, and both placenta connected by membrane.

The labor was terminated in less than ten minutes from the time the current was applied.

The patient made a good recovery.

The living infant weighed.....	5 lbs. 14 ozs.
The decapitated child.....	5 lbs. 8 ozs.
The placenta.....	2 lbs.

* As I could not conveniently use the blunt hook in this case, I was obliged to proceed in the following manner: I made a running loop of one end of the twine, and, having placed it around the dislocated portion of the neck, drew it tight enough to compress the part to be divided into the smallest possible compass. I then gave the free end of the cord and the body of the child to the midwife to hold in the position desired, while I passed two fingers along the twine, placing one finger above and one below the part to be divided, and, with a few clips of the scissors, completed the separation.

The successful application of electricity in this case, when labor had ceased for nearly three hours, is an evidence in favor of this agent that cannot be questioned.

CASE V.

Mrs. A——, aged 38; a tall, delicate woman, in labor twenty-nine hours with her eighth child. The pains had lingered on unsatisfactorily at intervals of half an hour from the commencement. The breech presented at the brim in the first dorso-anterior position. The os uteri had been fully dilated, and the waters discharged, for more than twenty hours. I administered a stimulating enema and a dose of ergot. The uterus responded in half an hour to this treatment, the pains increasing in frequency and continuing with moderate force for about two hours, when they ceased. Having visited the patient several times during the day, I was unwilling to spend much more time, especially as there was no obstacle, and nothing wanting to terminate the labor but expulsive uterine action. I therefore employed the faradic current for about eight minutes, and, after an interval of three, repeated the application but for two minutes only. The uterus, after a pause of four minutes, acted spontaneously and efficiently, the breech descending, when in about thirty-five minutes, a male child was born alive without manual aid. The placenta was expelled shortly afterwards.

The infant weighed..... 9 lbs. 6 ozs.

About an hour and a half after delivery a profuse flooding occurred, which was arrested in a few minutes by localized faradization.

This woman had had post-partum hemorrhage after her three previous confinements, the last two of which I have attended, employing with success Dr. T. E. Beatty's "anticipated treatment." But on this occasion I omitted this mode of preventing or arresting flooding, in order to test the relative value of ergot and electricity. Of one important fact I was cognizant, that faradization would not induce a relaxation of the uterus.

The use of electricity in obstetrics may thus enable us to dispense with other means of augmenting inefficient uterine action, and especially when the pains have become feeble, irregular, or intermittent. As to post-partum hemorrhage, it is undoubtedly the safest and most efficient means which we possess. Generally in tedious labor it is not a strong application that is desired so much as a current of moderate vigor and tension, with an extremely rapid interruption. I use the word rapid advisedly, as a slowly interrupted current would induce an irregular spasmodic contraction of the uterus, and thereby interfere with its due propulsive power.

Any good electro-magnetic apparatus, with a rapid vibration, will be

amply sufficient in all cases of unobstructed tedious labor, retained placenta, or post-partum hemorrhage, and also in resuscitating suspended animation in new-born infants.* But it is always advisable to have at hand in working order a double cell instrument, to avoid failure or disappointment.

In obstetrics the form of the electrode we should use is not of so much importance. That which presents a large surface answers the best. In my own practice I am in the habit of using electrodes made of thin plates of copper or zinc, six inches in length by three in width, and covered with sponge or flannel—the latter being preferred for the sake of cleanliness. Before using, the conductor should be dipped in warm water, to avoid creating a disagreeable sensation, which a cold wet electrode is apt to do when applied to the abdominal parietes. The operation can be easily performed under the bed clothes while the patient is lying on her back. One electrode may be placed over the fundus of the uterus and the other applied to the sacro-coccygeal region—a direction corresponding as nearly as possible to the long axis of the gravid uterus.

In my early treatment of lingering labor by faradization, I was in the habit of applying one electrode to the fundus uteri and the other to the pubis. In three cases I placed the poles over the lateral boundaries of the womb. By this method the application was too much localized; in proof of which I will mention that in one case of inertia uteri which I had under treatment, a partial hour-glass contraction of the anterior portion of the uterus was undoubtedly produced. A current passed transversely or through the anterior portion of the womb excites but a partial contraction of the organ, or only between the parts to which the electrodes are placed.

In order to stimulate inefficient uterine action up to the normal expulsive force, we should begin the application by gliding the conductor, which is applied to the abdomen, slowly and firmly over the fundus uteri, body, sides, and especially up and down the median line, until a decided contraction of the organ is manifest. When this occurs the conductor should be allowed to remain stationary over the fundus during the remainder of the application. This will prevent irregular uterine action. Our object is not to stimulate the uterus alone, but also the abdominal muscles, which are often in a faulty condition.

In all cases of protracted labor, with sluggish, inefficient action of the uterus in the second stage, or when uterine action has ceased, we should ascertain whether there is any obstacle in the way of delivery, before applying the electric stimulus. If, after a careful examination, we find

* The No. 4 Electro-Magnetic instrument, manufactured by the Galvano-Faradic Co., with their new attachment for extreme rapid interruption, is all that is desired.

no mechanical obstruction, by which either mother or child might be injured, faradization should then be used for from five to eight minutes, or long enough to induce a contraction of the whole circumference of the uterus. Subsequent applications, with short intermissions, to imitate the natural pains, may vary from half to two minutes in duration, according to the nature of the case and the effect the current may have upon the womb. In obstetrics, it is a matter of little importance which current we employ—the direct or indirect. I prefer the latter. We may even alternate them.

In the second stage of tedious labor an electrode of uncovered metal should not be applied directly to the uterus; for when the os is dilated, and the head of the infant in the pelvic cavity, or when it has entered the brim, the probability is that then we have none, or but a very small portion of the organ remaining *in situ*, to which the electrode can be applied. The vagina, bladder, and rectum are within reach, but these are not the parts which we wish to faradize. When the direct application is made with one or both poles to the anterior or posterior lip of the uterus, the lower segment or orificial zone is invariably thrown into contraction, instead of augmenting the *vis a tergo* or propulsive power of the whole organ.

Faradization will intensify uterine contractions during labor, and awaken them if suspended. I have applied it in a few cases before uterine action had spontaneously commenced, where the membranes had been accidentally ruptured at or about the full period of utero-gestation, when the waters had been discharged for one, two, or as many as six days. But in no case could I induce the natural process of labor, even when my application had been continued from twenty to thirty minutes at a trial, and repeated every two hours for several sittings.

There is a marked difference between the oxytotoxic action of ergot and faradization. Ergot, when administered, requires from ten minutes to an hour or more before it operates, and even then it oftentimes fails, or is ineffective. Generally its action is manifested by an increased heat, profuse diaphoresis, sometimes by nausea and vomiting, and by a violent and continuous contraction of a tetanic character. When once the full effect of the drug is produced, its action cannot be modified, but must, from its very nature, continue until the excitability of the uterus is exhausted or its contents expelled. The faradic current is simply an excito-motor stimulant. It fulfils in general all the requirements of ergot. Its action is almost always manifested in a few moments, and may be localized, while the strength of the application can always be approximated to the sensibility of the patient, and the effect to be accomplished; besides, the life of the infant is not endangered by its continued use. The contractions produced by faradism, especially when directed longitudinally through the uterus, are general, strongly propulsive, and in their direction equal with the normal expulsive force.

Faradization does not induce the same persistent state of contraction which we observe when ergot is administered, and, therefore, offers no obstacle to the removal of an adherent placenta; for by breaking the circuit the contractions pass off somewhat in the same manner as they do in natural labor. The rapidity of its action renders it valuable in those extreme cases which require a speedy delivery, but in which we particularly desire to avoid subsequent prostration. Besides, by simply shortening the duration of labor with perfect safety to both mother and child, it will be found useful.

Having employed faradization in 102 cases of labor, I have selected those already detailed as best showing its advantages as a true oxytocic. Many of the others were not without interest, but inasmuch as there was a similarity of feature in many, to describe them would only have been a waste of time and a repetition of facts. The few remarks in this paper have reference only to those cases in which delay was due to enfeeblement or failure of the natural powers of the organs, and this, too, in the second stage of labor. To sum up, faradization has in my hands, when used as an oxytocic in uterine inertia, terminated labor in from six to eight and ten minutes in a number of cases, and in the majority of cases in twenty-two. The longest time occupied in any case was fifty-six minutes. In four cases only the results obtained were, in a degree, negative. I must also state that in three cases of inertia uteri in the second stage of labor, I did not proceed so far as to effect the birth of the child by means of electricity. But this was owing to complications unconnected with parturition; to the patient's dread of the agent, which compelled me to discontinue it. In one case I was prevented by hæmoptysis from using faradism, in another by a femoral hernia which had descended during labor, and in the third by syncope connected with valvular disease of the right side of the heart.

POST-PARTUM HEMORRHAGE.

The most alarming form of uterine hemorrhage is that which occurs after the delivery of the child and placenta; of which the chief causes are more or less complete atony, imperfect or irregular contraction of the uterus.

Among the eight thousand (8,285) obstetric cases which I have personally attended, I have met with but comparatively few cases of post-partum flooding, and these, with the exception of five, treated by electricity, I have been able to arrest by the means ordinarily used.

I would here say, in regard to Dr. Barnes' method of using the perchloride of iron, that I would not hesitate to employ it, provided I could not obtain a good electro-magnetic apparatus. And also as to transfusion of blood as a means of treatment in cases of excessive hemorrhage after delivery, I would state that I have assisted my professional

brethren in two cases which proved unsuccessful. In one of them I supplied eight ounces of blood, six ounces of which was injected into the median vein with apparent success—so far at least as sustaining life for two hours and forty minutes.

The Faradic current possesses feeble electrolytic properties, and is, therefore, useless as a means of coagulating blood; we use it only as an excito-motor stimulant in controlling flooding. It operates by exciting uterine contraction, and thus closing the mouths of the bleeding vessels through a compression of the muscular fibres of the uterus.

The mode of applying electricity in flooding after delivery is a point of practice as yet unsettled. The electrode which I have had constructed for this special purpose has answered admirably in the few cases in which I have used it. The conductor is inserted into the cavity of the uterus as far as the disk, and a connection made with the positive pole, and then the circuit is closed by a large, well-moistened sponge electrode placed over the region of the uterus.

In order to excite uterine contraction in post-partum hemorrhage, a strong faradic current is generally required, and especially when atony of the womb is very profound. But it is advisable, as a rule, to commence treatment with a moderate current, and then gradually increase its strength until uterine action is manifested. This is necessary in the majority of cases, as some patients are more susceptible to the electric stimulus than others, and it is especially necessary when the metallic electrode is directly applied to the uterine cavity. If the hemorrhage is not speedily arrested by this means, vigorous shocks of the faradic coil should be given every few seconds until a tonic contraction is induced. After the flooding has been restrained, an application of moderate tension should then be used for six or eight minutes, to counteract the tendency to relaxation of the uterine muscular fibres.

A point I would specially insist upon is this, when the hemorrhage has been checked, the strength of the current should be reduced *very slowly*. This is important when we consider the atonic condition of the womb. Breaking the circuit abruptly, by the withdrawal of the electric stimulus, would result probably in a relaxation of the organ, and so expose the patient to a recurrence of flooding. It is important also to use an instrument in which the current is rapidly broken; one with slow interruptions would be productive of mischief at this stage.

I will mention one case out of five of post-partum hemorrhage which I have treated by electricity.

Mrs. C —, aged 30; a delicate woman, had slight general anasarca and marked anæmic appearance. She was in labor with her third child. On examination I found a head presentation in the first position, and well advanced in the pelvis. After a natural and easy labor of three hours a small, delicate infant was born, and in about five minutes afterwards the placenta was spontaneously expelled.

About thirty-five minutes after delivery a profuse hemorrhage occurred

and continued with little interruption for nearly ten minutes. By grasping the uterus through the abdominal parietes, by cold applications, by ergot and by pressure, I was enabled to prevent the further loss of blood. Although ~~the~~ ^{she} manifested no signs of flooding during the two hours I remained with her, yet, as a precautionary measure, and to insure a permanent contraction, I administered a full dose of ergot, and reapplied the binder with a compress. Before I left, I ascertained that the uterus was firmly and uniformly contracted. Five hours afterwards I was hastily summoned to her bedside by a messenger who stated that she was bleeding to death. On arriving, I found the general surface of her body cold, pale, and covered with a clammy perspiration. The patient was almost pulseless; she kept throwing her arms about, gasping for breath, desiring to have the windows and doors open for the admission of air, and to have her body raised to the sitting posture. She had at this time lost a large quantity of blood. While I was endeavoring to control the flooding, convulsions set in and continued for about twenty minutes. During this period the hemorrhage had ceased, but in about forty minutes afterward it recurred with renewed violence. I introduced my hand into the uterus for the purpose of removing coagula of blood, and also to excite uterine contraction, but this, together with the means ordinarily used, failed to occasion more than a momentary cessation of the flooding. The uterus apparently had lost all contractile power, the walls were soft and flabby, and felt somewhat like a piece of wet chamois leather. At this point I applied faradization, placing the positive pole in the uterine canal, and the negative to the abdomen over the uterus, using a strong current for about six minutes. The uterus responded to this treatment, but not sufficiently to check the hemorrhage. I then passed a succession of short, vigorous shocks of the secondary coil, which in a few moments induced a tonic contraction, and completely arrested the flooding. Subsequent to this I remained with the patient about three hours, during which I made several electrical applications of two or three minutes' duration. I made six of these in the first hour, and four in the second, applying the uterine electrode, without the central stem, directly to the lower segment of the uterus.

This mode of treatment produced a profound impression on the organ, maintaining a permanent and general contraction. Afterwards stimulating cordials were administered warm, and in small quantities, for the purpose of recruiting and sustaining her strength.

I may state that in this case excessive vomiting occurred during the flooding, which faradization, even with brandy and ice, failed to check. I cut four raw oysters into small pieces, and gave her a few pieces every two or three minutes with a tablespoonful of the liquid contained in the oysters. The third dose checked the emesis. On the thirteenth day after her confinement she was able to leave her bed.

The child weighed 6 lbs. The placenta was of medium size, and about one-third in a state of fatty degeneration.

I would here mention that the occurrence of the vomiting did not arrest or perceptibly lessen the hemorrhage.

ELECTRICITY IN SUSPENDED ANIMATION IN NEW-BORN INFANTS.

Of late, faradization has been used for the purpose of resuscitating asphyxiated new-born infants. I have applied it in twenty-nine cases, with the result of restoring animation in twenty-three children, in five of which the usual means had failed to produce any marked effect.

The method I usually adopt is to place the child on its back, with the head and shoulders somewhat elevated, to cleanse the mouth and fauces of mucous, and while getting ready the electrical instrument and electrodes to employ the ordinary means of resuscitation or artificial respiration. Though the child should present a livid countenance, and other signs of cerebral congestion, this should not deter us from using faradism; for when respiration occurs, the livid hue will soon disappear.

If, after a minute or two, no signs of animation can be observed, I place the infant, especially if the body is pale and cold, in a warm bath at about 98° Fahr., or in an electric bath.* The positive pole I apply to the epigastrium, and the negative to the apex of the heart, employing well-moistened sponges, and a current of sufficient strength to excite a full contraction of the diaphragm. When respiration occurs, but is not fully established, I use both poles labile over the precordial region, until the heart's action has become strong and rhythmical. Generally, my treatment does not cease when the beating of the heart is observed at the precordia or neck, nor when feeble respiration occurs, but only when the child opens its eyes, cries, or when six or seven inspirations are made spontaneously in the minute. The infant, after resuscitation, should be washed and dressed quickly, and with gentleness, or, what is still better, it should be wrapped in warm dry flannels, and placed on its right side in a warm bed, or before the fire, and allowed to sleep.

Faradization to the phrenic nerve in asphyxia neonatorum is a mode of treatment I rarely employ. I lost one child by this method when life was partially restored. When applying a strong faradic current to this nerve, as soon as respiration occurs, the strength of the application should at once be reduced to a moderate degree, and applied about ten or twelve times in the minute for one or two seconds only, otherwise a powerful current continued would render all our efforts to restore life nugatory.

*A bath can easily be constructed by using large sponge electrodes; those used for exciting uterine action will answer, one placed at each end of the bath-tub, and by using biturcated cords.

Faradism should be used as long as there is a probability of resuscitating the child; for fifteen minutes at least. *In all cases of suspended animation in new-born children, powerful shocks of a faradic coil are to be specially avoided.*

CASE I.

On the morning of the 28th Nov., 1874, I was called to attend a German lady, aged 19 years, first pregnancy in labor at full term. A vaginal examination showed that the os uteri was well dilated, the membranes unruptured, a right shoulder presentation — abdomino-anterior. After turning the child, and before I could extract the arms, a profuse flow of blood occurred, which continued in a constant stream from the vagina until the infant was born. This unusual and alarming casualty produced a little delay in bringing down the arms, and led me to suspect that the uterus had been ruptured. Uterine action had ceased, which was embarrassing, and placed the child's life in imminent danger, especially as the funis had already ceased pulsating. I placed the forceps upon the infant's head, and faradized the uterus by the external method. By this procedure the delivery of the child and expulsion of the placenta were speedily effected.

The cause of the flooding was the premature detachment of a portion of the placenta.

The child when born seemed to be dead, for the body was pale and relaxed, and the pulsations of the cord had ceased a few minutes before birth. A peculiar spasmodic eversion of the lips (not a gasping movement) occurred four or five times. This occurrence is occasionally observed when death is imminent either from delay or forcible traction upon the neck when extracting the infant's head by podalic delivery.

The child was placed in a warm bath, about blood heat, the mouth and fauces having been previously cleansed of mucus. Faradism was applied by placing the positive pole upon the diaphragm and the negative over the heart, and using a tolerably strong current for about two minutes, when a full contraction of the diaphragm and the first feeble inspiration occurred. After an interval of about ten seconds the treatment was repeated. During the third and last application the infant opened its eyes and cried lustily. In about seven minutes from the commencement of treatment, or twelve minutes from the time the funis had ceased pulsating, the heart's action and respiration were fully established.

CASE II.

I was called, on the 16th of March, 1875, to attend Mrs. K —, aged 29 years, in labor ten hours with her fourth child. An examination revealed that a loop of the funis had descended outside the vulva, and was pulsating feebly, and a right breech presentation — sacrum-posterior. As I was about to replace the prolapsed cord by a modification of the postural method, I found that the pulsations of the funis had

now ceased. The uterus being fully dilated, further delay would, in the present complication, jeopardize any life which might be remaining in the infant. I, therefore, applied a soft linen handkerchief as a fillet around the flexure of the right thigh* and faradized the uterus. By this means I was soon able to effect the birth of the child, a male, weighing 8 lbs. 10 ozs. The placenta was thrown off in three minutes afterward; funis, 45 inches in length.

The infant at its birth was to all appearances lifeless, the face turgid, and of a dark, livid hue, the umbilical cord pulseless, and when divided was followed by no issue of blood. The only evidence of life was a fluttering pulsation in the cardiac region. Artificial respiration was employed for a short time without effect. A faradic current was then applied in the manner already detailed. After the lapse of a few minutes, the fetal heart was distinctly audible, but no respiratory action discernible. I now made a few applications to the phrenic nerve and diaphragm of about two seconds each, and in about a minute a feeble inspiration occurred, followed by a long gurgling expiration, and a discharge of a large quantity of mucous froth from the mouth and nose. This occurrence, which I have always considered as the last evidence of life, somewhat discouraged me from making any further attempt at resuscitation.

Notwithstanding, I persevered in my electrical applications to the epigastrium and cardiac region, and had the satisfaction of restoring life in about seventeen minutes. The child being in a very weak condition, was wrapped in a warm blanket and placed on a pillow before the fire, and after a sound sleep of two hours, awoke in the full vigor of life.

*The use of the blunt hook invariably produces a contusion or laceration of the soft parts of the limb to which it is applied, and occasionally a dislocation or fracture. This in some special cases is unavoidable. A shock from an injury of the nature mentioned would undoubtedly occasion another evil, and probably sacrifice the child.

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